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TITLE: PICTURE QUALITY ADJUSTMENT METHOD AND
                PICTURE QUALITY ADJUSTMENT APPARATUS

INVENTORS: Yoshinari SHIRATA, Yoshiki KOURA,
                Masayoshi MIURA

William S. Frommer
Registration No. 25,506
FROMMER LAWRENCE & HAUG LLP
745 Fifth Avenue
New York, New York   10151
Tel. (212) 588-0800

PICTURE QUALITY ADJUSTMENT METHOD AND

PICTURE QUALITY ADJUSTMENT APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to a picture quality adjustment method and a picture quality adjustment apparatus for a video outputting apparatus such as a DVD (Digital Versatile Disc) player or a set top box.

Where a video signal outputted from a video outputting apparatus such as a DVD player or a set top box is signaled to and displayed on a video display apparatus, in order to adjust the picture quality of an image to be displayed such as an average brightness or a brightness contrast, a method is conventionally employed wherein an adjustment operation is performed on the video display apparatus side to adjust the picture quality.

However, video software (contents) which is authored in various manners, belongs to various genres (categories) or has various image characteristics may be outputted from a video outputting apparatus such as a DVD player or a set top box.

Therefore, it is difficult to always obtain an image of an optimum picture quality by a single operation for adjustment of the picture quality on the video

display apparatus side. Thus, the user must perform a picture quality adjustment operation every time the authoring, genre or image characteristic of video software to be outputted from the video outputting apparatus changes. Therefore, a heavy burden is imposed on the user in terms of the picture quality adjustment operation.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a picture quality adjustment method and a picture quality adjustment apparatus wherein, if a user performs a picture quality adjustment operation once, even if a picture quality adjustment operation is not performed any more for video software of the same authoring, genre or image characteristic, an image of an optimum picture quality can be obtained while significantly decreasing the burden to the user in picture quality adjustment operation.

In order to attain the object described above, according to an aspect of the present invention, there is provided a picture quality adjustment method, comprising the steps of writing a picture quality adjustment condition for a video signal as picture quality

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adjustment data in a corresponding relationship to video

identification information for specifying a video or

characteristic describing information which describes an

image characteristic into a memory which is capable of

keeping storage contents thereof without a power supply

or with a backup power supply, and reading out, upon

outputting of a video, if the video identification

information or the characteristic describing information

of a video signal to be outputted and the corresponding

picture quality adjustment data are stored in the memory,

the picture quality adjustment data from the memory and

setting a picture quality adjustment condition for the

video signal to be outputted in accordance with the read

out picture quality adjustment data.

According to another aspect of the present

invention, there is provided a picture quality adjustment

apparatus, comprising a memory capable of keeping storage

contents thereof without a power supply or with a backup

power supply, and a control section for writing a picture

quality adjustment condition for a video signal as

picture quality adjustment data in a corresponding

relationship to video identification information for

specifying a video or characteristic describing

information which describes an image characteristic into

the memory and reading out, upon outputting of a video,
if the video identification information or the
characteristic describing information of a video signal
to be outputted and the corresponding picture quality
adjustment data are stored in the memory, the picture
quality adjustment data from the memory and setting a
picture quality adjustment condition for the video signal
to be outputted in accordance with the read out picture
quality adjustment data.

With the picture quality adjustment method and the
picture quality adjustment apparatus, if a user performs
a picture quality adjustment operation once, then even if
a picture quality adjustment operation is not performed
any more for video software of the same authoring, genre
or image characteristic, an image of an optimum picture
quality can be obtained while significantly decreasing
the burden to the user in picture quality adjustment
operation.

It is to be noted that, where a video outputting
apparatus is a video playback apparatus such as a DVD
player which plays back, from a recording medium such as
a disk, videos recorded on the recording medium, the
video identification information above includes
information for specifying the recording medium such as a

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disk ID (identification information), and generally is
information which specifies a program, a genre or a scene.

If a disk has no disk ID recorded thereon, then
header information of the disk is combined suitably in
accordance with a predetermined rule such as a
combination of the number of chapters included in the
disk and a play time, and the combination is used as a
disk ID of the disk.

Further, the characteristic describing information
above is a description of image characteristic for each
unit of images developed in a time series such as
programs or scenes, and is hereinafter referred to as
"metadata".

The above and other objects, features and
advantages of the present invention will become apparent
from the following description and the appended claims,
taken in conjunction with the accompanying drawings in
which like parts or elements denoted by like reference
symbols.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing a DVD player to
which the present invention is applied;

FIG. 2 is a similar view but showing another DVD

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player to which the present invention is applied;

FIGS. 3 and 4 are flow charts illustrating an example of an adjustment processing routine performed by a system controller of the DVD player of FIG. 1 or 2;

FIGS. 5A and 5B are views illustrating an example of a storage condition of memories of the DVD player of FIG. 1 or 2;

FIG. 6 is a block diagram showing a digital TV receiver to which the present invention is applied; and

FIG. 7 is a similar view but showing another digital TV receiver to which the present invention is applied.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

1. Embodiments wherein the invention is applied to a DVD player ...... FIGS. 1 to 5B

1-1. Outline of the player system ...... FIGS. 1 and 2

FIGS. 1 and 2 show different embodiments wherein the present invention is applied to a DVD player.

Referring to FIGS. 1 and 2, a video signal and an audio signal in a form compressed, coded and multiplexed in conformity with, for example, the MPEG (Moving Picture Experts Group) 2 standards and a disk ID are recorded on a disk 11.

It is to be noted that a plurality of pieces of video software (contents) may be recorded on the same disk. In this instance, video identification information (information for specifying videos) is different from the disk ID. However, the following description is given particularly of a case wherein such video identification information is a disk ID.

Such metadata as described hereinabove can be recorded on the disk 11, and in the present embodiments, it is assumed that metadata are recorded on some disks. FIG. 1 shows a DVD player for a disk on which metadata are recorded in a multiplexed condition separately from a video and audio data stream while FIG. 2 shows another DVD player for another disk on which metadata are recorded in a multiplexed form in and together with a video and audio data stream.

The metadata include data of an average brightness, a brightness contrast, a ratio between bright and dark regions, a brightness transition coefficient on a time series, a color balance, presence or absence of application of a visual effect and so forth as image characteristics. Where the metadata are recorded in a multiplexed form separately from a video and audio data stream, it describes image characteristics such as

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information representative of a section of video information, the lowest brightness in the section, the highest brightness, an average brightness and so forth. The information representative of a section is described with a presentation timestamp or the like.

The disk 11 is driven to rotate by a drive mechanism 21 which includes a disk motor and a driving circuit for the disk motor not shown. An optical head 12 is driven by a drive mechanism 22 which includes a feed motor and tracking and focusing actuators not shown. The drive mechanism 21 and 22 are controlled by a servo controller 23, which in turn is controlled by a system controller 24 which controls the entire player system.

An operation section 25 such as a remote controller is provided for the system controller 24 such that the user can perform adjustment of the picture quality of a playback image through the operation section 25. Also a display section 26 including a display unit such as a liquid crystal display device not shown is provided for the system controller 24.

A first memory 27 and a second memory 28 are connected to the system controller 24. Each of the first memory 27 and the second memory 28 is formed from an EAROM (Electrically Alterable Read Only Memory) or a

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flash memory and can keep stored contents thereof without
using a power supply or through the use of a backup power
supply. Picture quality adjustment data can be written in
a corresponding relationship to a disk ID in the first
memory 27 while the picture quality adjustment data can
be written in a corresponding relationship to metadata in
the second memory 28. The first memory 27 and the second
memory 28 may be two memories physically separate from
each other or two different areas of one memory.

Alternatively, each or both of the first memory 27
and the second memory 28 may be an external storage
medium such as a memory card. Where an external storage
medium is used, by using different external storage media
depending upon whether a CRT display unit or a liquid
crystal projector display unit is used as a video display
apparatus, the video display apparatus having different
display characteristics can be selectively used
appropriately. Also it is possible to prepare in advance
an external storage medium in which picture quality
adjustment data and metadata produced with a displaying
performance of a video display apparatus taken into
consideration are written.

Information read from the disk 11 and outputted
from the optical head 12 is supplied to a radio frequency

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(RF) processor 13. The RF processor 13 includes a
generation section for generating a tracking error signal
and a focusing error signal, an error correction section,
a buffer section, a data stream detection and separation
section, and a metadata detection and separation section
not shown. Thus, a disk ID, a tracking error signal and a
focusing error signal, and a video and audio data stream
of the MPEG 2 standards are obtained from the RF
processor 13.

Where the metadata are in the multiplexed form
separately from a video and audio data stream, the
metadata are detected and separated by the RF processor
13 and fetched by the system controller 24 as seen from
FIG. 1.

It is to be noted that, where caption data are
multiplexed, they are detected and separated by the RF
processor 13 and are played back by a caption playback
section not shown and then superimposed with the video
signal by a video playback processing section 15 which is
hereinafter described.

The disk ID is fetched by the system controller 24.
The tracking error signal and the focusing error signal
are supplied to the servo controller 23, by which they
are used for tracking servo control and focusing servo

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control of the optical head 12.

The video and audio data stream from the RF processor 13 is separated into a video data stream and an audio data stream and then decompressed and decoded into video data and audio data by an MPEG decoder 14.

Where the video and audio data stream has metadata multiplexed therein, the metadata are demultiplexed from the video and audio data stream by the MPEG decoder 14 and fetched by the system controller 24 as seen in FIG. 2.

The video data are outputted from the MPEG decoder 14 and separated into brightness data and color difference data by the video playback processing section 15. The video playback processing section 15 further performs picture quality adjustment processing for the thus separated brightness data or color difference data and then synthesizes the brightness data and the color difference data to obtain video data of the same format as that of the video data inputted to the video playback processing section 15.

The picture quality in this instance includes, for the brightness, the lowest brightness, the highest brightness, an average brightness, a brightness contrast, and a contour emphasis (contour compensation) characteristic and, for the color, a color gain (color

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concentration), a hue and so forth.

The video data outputted from the video playback processing section 15 are converted on one hand into an analog video signal of the NTSC system, the PAL system or the progressive system by an analog output encoder 16. The analog video signal obtained is outputted to a video display apparatus such as a CRT display apparatus or a liquid crystal projector display apparatus not shown, an analog video and audio apparatus such as an analog TV (Television) receiver or some other analog video apparatus not shown.

The video data outputted from the video playback processing section 15 are on the other hand outputted, after they are converted into video data of some other format by a digital output encoder 17 or without undergoing such conversion, to a digital video and audio apparatus such as a digital TV receiver or some other digital video apparatus not shown through a digital interface 18 such as an interface complying with the IEEE (Institute of Electrical and Electronics Engineers) 1394 standards.

The audio data outputted from the MPEG decoder 14 are subject to audio playback processing by an audio playback processing section 19. Though not shown, in

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conformity with the video data outputted from the video

playback processing section 15, the audio data outputted

from the audio playback processing section 19 are on one

hand converted into an analog audio signal and outputted

to an audio outputting apparatus such as a speaker

apparatus or a headphone apparatus, an analog video and

audio apparatus such as an analog TV receiver or some

other analog audio apparatus not shown, and on the other

hand outputted through the digital interface 18 after

multiplexed with the video data after converted into

audio data of some other format or without undergoing

such conversion or through another digital interface not

shown without being multiplexed with the video data to a

digital video and audio apparatus such as a digital TV

receiver or some other digital audio apparatus not shown.

1-2. Picture quality adjustment …… FIGS. 3 to 5B

The player system of FIG. 1 or 2 having such a

construction as described above performs picture quality

adjustment, for example, in accordance with an adjustment

process routine illustrated in FIGS. 3 and 4 while a

playback image is displayed on an image display apparatus

not shown connected to the player system.

In particular, in the adjustment process routine

illustrated in FIGS. 3 and 4, after playback of a certain

disk is started, the system controller 24 first fetches

the disk ID of the disk in step 31 illustrated in FIG. 3.

If the disk does not have a disk ID recorded thereon,

then header information of the disk is combined in

accordance with a predetermined rule to produce a disk ID

for the disk as described hereinabove.

Then in step 32, the system controller 24

discriminates whether or not the disk ID is stored in the

first memory 27. When the disk of the disk ID is played

back for the first time, the first memory 27 does not

have the disk ID stored therein.

If the disk ID is not stored in the first memory 27,

then the processing advances from step 32 to step 33, in

which the system controller 24 discriminates whether or

not metadata are detected. If metadata are not detected,

then the processing advances from step 33 to step 51

directly without performing adjustment of the picture

quality of the playback image.

However, if metadata are detected in step 33, then

the processing advances from step 33 to step 34, in which

the system controller 24 controls the display section 26

to display to inform the user that metadata are detected.

Then, the processing advances to step 35, in which the

system controller 24 discriminates whether or not the

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metadata then and picture quality adjustment data corresponding to the metadata are stored in the second memory 28.

If the metadata then and the corresponding picture quality adjustment data are not stored in the second memory 28, then the processing advances from step 35 to step 41, in which the system controller 24 sets the picture quality of the playback image to a picture quality set in advance, for example, to a picture quality in a state wherein no picture quality adjustment is performed for brightness data and color difference data by the video playback processing section 15. Thereafter, the processing advances to step 51.

On the contrary if the metadata then and the corresponding picture quality adjustment data are stored in the second memory 28 in step 35, then the processing advances from step 35 to step 43, in which the system controller 24 reads out the picture quality adjustment data corresponding to the metadata then from the second memory 28. Then, the processing advances to step 44, in which the system controller 24 executes picture quality adjustment in accordance with the thus read out picture quality adjustment data. Thereafter, the processing advances to step 51.

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If the disk ID fetched or produced in step 31 is stored in the first memory 27 in step 32, then the processing advances from step 32 to step 45, in which the system controller 24 reads out the picture quality adjustment data corresponding to the disk ID from the first memory 27. Thereafter, the processing advances to step 46, in which the system controller 24 executes picture quality adjustment in accordance with the thus read out picture quality adjustment data. Then, the processing advances to step 51.

Referring now to FIG. 4, in step 51, the system controller 24 discriminates whether or not a picture quality adjustment operation is performed by the user.

The user can perform adjustment or alteration of the picture quality through a picture quality adjustment operation of the operation section 25 not only when the picture quality of the playback image is not adjusted because no metadata are detected but also when the picture quality of the playback image is not set to the picture quality condition set in advance in step 41, when picture quality adjustment is performed in accordance with the picture quality adjustment data corresponding to the metadata stored in the second memory 28 in step 44 or when picture quality adjustment is performed in

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accordance with the picture quality adjustment data

corresponding to the disk ID stored in the first memory

27 in step 46.

Then, when the user performs a picture quality

adjustment operation, the system controller 24 advances

the processing from step 51 to step 52, in which it

alters the picture quality adjustment data in response to

the adjustment operation of the user and executes picture

quality adjustment in accordance with the adjustment

operation of the user. Thereafter, the processing

advances to step 53. On the other hand, if the user does

not perform a picture quality adjustment operation in

step 51, then the processing advances from step 51 to

step 53 directly.

In step 53, the system controller 24 controls the

display section 26 to display for inquiry to the user of

whether or not the picture quality adjustment condition

then should be stored as a picture quality adjustment

condition corresponding to the disk or a picture quality

adjustment condition corresponding to the metadata then.

Not only when a picture quality adjustment

operation is performed but also when a picture quality

adjustment operation is not performed, the user can store

the picture quality adjustment condition then as a

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picture quality adjustment condition corresponding to the disk or a picture quality adjustment condition corresponding to the metadata then. If the user wants to store the picture quality adjustment condition then, it will perform an operation therefor, but otherwise, it will perform an operation therefor.

Then, the processing advances from step 53 to step 54, in which the system controller 24 discriminates whether or not the response of the user represents the storage. If the response represents the storage, then the processing advances from step 54 to step 55, in which the system controller 24 discriminates whether or not the first memory 27 has some free or unoccupied area. If the first memory 27 has some free area, then the processing advances from step 55 to step 56, in which the system controller 24 writes the picture quality adjustment data then in a corresponding relationship to the disk ID of the disk into the first memory 27. Thereafter, the processing advances to step 58.

In this instance, if metadata are detected, then the system controller 24 writes the picture quality adjustment data then in a corresponding relationship not only to the disk ID but also to the metadata into the first memory 27 and further writes the picture quality

adjustment data then in a corresponding relationship to the metadata into the second memory 28.

On the other hand, if the picture quality adjustment data are already stored in a corresponding relationship to the disk ID in the first memory 27, then the system controller 24 rewrites the picture quality adjustment data. Further, if the picture quality adjustment data are stored in a corresponding relationship to the metadata in the second memory 28, then the system controller 24 rewrites the picture quality adjustment data.

If the first memory 27 does not have a free area in step 55, then the processing advances from step 55 to step 57, in which an editing process is executed, whereafter the processing advances to step 58.

The editing process in step 57 may be to erase those ones of disk IDs and corresponding picture quality adjustment data stored in the first memory 27 which were registered oldest and store the disk ID then and the corresponding picture quality adjustment data or to erase the oldest disk ID and corresponding picture quality adjustment data and determine whether or not the disk ID then and the corresponding picture quality adjustment data should be stored in accordance with selection of the

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user.

On the other hand, if it is discriminated in step 54 that the response of the user does not represent an intention of the storage, then the processing advances from step 54 to step 58 directly.

The user may not intend storage of the picture quality adjustment condition, for example, when the disk 11 is played back temporarily using a liquid crystal projector display apparatus as the video display apparatus in place of a CRT display apparatus and the user does not want that the picture quality adjustment state set and stored for the normally used CRT display apparatus is altered.

In step 58, it is discriminated whether or not the disk is being played back. If the disk is being played back, then the processing returns from step 58 to step 33 so that the processing beginning with step 33 is repeated. If the playback of the disk comes to an end, then the adjustment process is ended as well.

It is to be noted that, for a user who considers that it is cumbersome to respond to the display (inquiry) in step 53 whether or not the picture quality adjustment condition then should be stored every time, the adjustment process routine to be executed by the system

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controller 24 may be set otherwise such that the

discrimination in step 54 normally is to store the

picture quality adjustment condition then.

As an example, it is assumed that, when the first

memory 27 and the second memory 28 have no picture

quality adjustment data stored therein, a disk of the

disk ID of "D1" on which metadata M1 and M2

representative of image characteristics for two video

scenes are recorded is played back first.

At this instance, for example, if the image

characteristic of the video scene whose image

characteristic is indicated by the metadata M1 is that

"the average brightness is high" and the user adjusts the

picture quality so as to lower the average brightness

whereas the image characteristic of the video scene whose

image characteristic is indicated by the metadata M2 is

that "the brightness contrast is low" and the user

adjusts the picture quality so as to raise the brightness

contrast and then the user issues an instruction to store

the individual picture quality adjustment data then, then

the individual picture quality adjustment data are

written in a corresponding relationship to the disk ID

"D1" and in a corresponding relationship to the metadata

M1 and M2 into the first memory 27 as seen in FIG. 5A and

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further the individual picture quality adjustment data
are written in a corresponding relationship to the
metadata M1 and M2 into the second memory 28 as seen in
FIG. 5B.

It is assumed that, in this state, another disk of
the disk ID of "D2" on which no metadata is recorded is
played back subsequently. At this time, if the user
adjusts the picture quality and issues an instruction to
store the adjustment data then, then the picture quality
adjustment data then are written in a corresponding
relationship to the disk ID "D2" into the first memory 27
as seen in FIG. 5A.

Then, it is assumed that a further disk of the disk
ID of "D3" on which metadata M1 indicative of an image
characteristic for a certain video scene is played back
subsequently. The metadata M1 and the corresponding
picture quality adjustment data are already stored in the
second memory 28. Accordingly, at this time, picture
quality adjustment of the video scene whose image
characteristic is indicated by the metadata M1 is
executed in step 44 in accordance with the picture
quality adjustment data corresponding to the metadata M1
read out from the second memory 28.

On the other hand, if the user issues an

instruction to store the picture quality adjustment data

then without performing picture quality adjustment or

after it performs picture quality adjustment, then the

picture quality adjustment data are written in a

corresponding relationship to the disk ID "D3" and also

in a corresponding relationship to the metadata M1 into

the first memory 27 as seen in FIG. 5A, and the picture

quality adjustment data corresponding to the metadata M1

stored in the second memory 28 are rewritten with the

picture quality adjustment data then as seen in FIG. 5B.

Thereafter, if the disk of the disk ID of "D1" on

which the metadata M1 and M2 are recorded is played back,

then picture quality adjustment of the video scene whose

image characteristic is indicated by the metadata M1 is

executed in step 46 in accordance with the picture

quality adjustment data read out from the first memory 27

and corresponding to the disk ID "D1" and the metadata M1.

Meanwhile, picture quality adjustment of the video scene

whose image characteristic is indicated by the metadata

M2 is executed in step 46 in accordance with the picture

quality adjustment data read out from the first memory 27

and corresponding to the disk ID "D1" and the metadata M2.

In the player system of FIG. 1 or 2 described above,

when a user performs an operation to store picture

quality adjustment data, picture quality adjustment data then are written into the first memory 27 in a corresponding relationship to the disk ID and further in a corresponding relationship to metadata then. Then, when the disk is to be played back thereafter, the picture quality adjustment data corresponding to the disk and corresponding to metadata then are read out from the first memory 27 and a picture quality adjustment condition is set in accordance with the picture quality adjustment data. Consequently, the user can obtain a playback image of an optimum picture quality from the same disk without performing a picture quality adjustment operation in a unit of a video every time playback is to be performed.

Further, the picture quality adjustment data are written in a corresponding relationship to the metadata into the second memory 28 in accordance with an operation history of the user. Then, when the disk on which the same metadata are recorded is to be played back later, picture quality adjustment data corresponding to the metadata are read out to set a picture quality adjustment condition. Consequently, the user can obtain a playback image of an optimum picture quality from the disk on which the same metadata are recorded without performing a

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picture quality adjustment operation every time playback is to be performed.

1-3. Another example of the first memory

In the player system of FIG. 1 or 2, if it is intended to store a disk ID and corresponding picture quality adjustment data of a large number of disks into the first memory 27, then a memory having a large capacity is required for the first memory 27 or such an editing process as described hereinabove is required.

Thus, if the disk 11 is of the recordable type or the rewritable type, then part of the area of the disk 11 may be utilized as the first memory. In this instance, although a circuit for writing picture quality adjustment data is required, the system controller 24 may be constructed so as to store picture quality adjustment data for a disk to be played back into an internal RAM such that, when the user performs an operation to store picture quality adjustment data, picture quality adjustment data then are written into the area of the disk 11 which is utilized as the first memory, and then when the same disk is to be played back, the picture quality adjustment data are fetched together with the disk ID from the disk and stored into the internal RAM.

1-4. A further example of the first memory

According to the first memory 27 shown in FIG. 5A,
metadata are not recorded on the disk whose disk ID is
"D2", and the disk ID "D2" and corresponding picture
quality adjustment data are stored without being made
correspond to metadata into the first memory 27. For a
disk on which metadata are not recorded in this manner,
the first memory 27 can be used in the following manner.

It is presumed that, with the disk whose disk ID is
"D2", it is necessary to change the picture quality
between a plurality of sections such as a front half
section and a rear half section. In this instance, the
system controller 24 produces information pieces T1, T2
and so on representative of individual sections based on
information of a presentation timestamp and so forth and
writes picture quality adjustment data C1, C2 and so on
of the individual sections in a corresponding
relationship to the information pieces T1, T2 and so on
in place of metadata into the first memory 27.

Then, when the same disk is to be played back,
since the information pieces T1, T2 and so on
representative of the individual sections are recorded in
the metadata describing column for the disk whose disk ID
in the disk ID describing column in the first memory 27
is D2, the system controller 24 detects the individual

sections and executes picture quality adjustment in the individual sections in accordance with the corresponding picture quality adjustment data C1, C2 and so on.

Where the first memory of the construction described above is used, even when a disk on which metadata are not recorded is to be played back, the picture quality adjustment condition can be changed over automatically in a plurality of sections.

2. Other embodiments …… FIGS. 6 and 7

A picture quality adjustment method of the present invention can be applied not only to a video playback apparatus such as a DVD player but also to a video outputting apparatus such as a TV receiver.

Also in TV broadcasting, video software (contents) which is authored in various manners, belongs to various genres or has various image characteristics is broadcast. Particularly in digital TV broadcasting, a program ID, a genre ID or the like is transmitted, and characteristic describing information (metadata) can be inserted into and transmitted together with a program or a scene.

FIGS. 6 and 7 show embodiments wherein the present invention is applied to a digital TV receiver. Particularly, FIG. 6 shows an embodiment wherein metadata are multiplexed and broadcast separately from a video and

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audio data stream, and FIG. 7 shows another embodiment

wherein metadata are multiplexed into and broadcast

together with a video and audio data stream.

Referring to FIGS. 6 and 7, a broadcast reception

section 62 receives and selects a broadcast digital TV

signal under the reception control of a system controller

24 in accordance with an operation by an operation

section 25. The received and selected signal is supplied

to a RF processor 63. The RF processor 63 includes a

demodulation section, an error correction section, a data

stream detection and separation section and a metadata

detection and separation section not shown. Thus, a

program ID (or genre ID) and a video and audio data

stream of the MPEG system are obtained from the RF

processor 63.

Where metadata are multiplexed separately from a

video and audio data stream, the metadata are detected

and separated by the RF processor 63 and fetched by the

system controller 24 as seen in FIG. 6.

The program ID (or genre ID) is fetched by the

system controller 24. The video and audio data stream

from the RF processor 63 is separated into a video data

stream and an audio data stream and then decompressed and

decoded into video data and audio data by an MPEG decoder

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64.

On the other hand, where the metadata are multiplexed in the video and audio data stream, the metadata are separated from the video and audio data stream and fetched by the system controller 24 as seen in FIG. 7.

The video data outputted from the MPEG decoder 64 are separated into brightness data and color difference data by a video playback processing section 65. The video playback processing section 65 further performs a picture quality adjustment process for the thus separated brightness data or color difference data and then synthesizes the brightness data and the color difference data to obtain video data of a format same as that of the video data inputted to the video playback processing section 65. The video data outputted from the video playback processing section 65 are converted into an analog video signal of the NTSC system or like.

The audio data outputted from the MPEG decoder 64 undergo an audio playback process and then are converted into an analog audio signal by an audio playback processing section 69.

Also each of the digital TV receivers described above with reference to FIGS. 6 and 7 includes the first

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memory 27 and the second memory 28, and picture quality

adjustment data are written in a corresponding

relationship to a program ID (or genre ID) into the first

memory 27. Then, when a program in which the same program

ID (or genre ID) is inserted is received next, the

picture quality adjustment data corresponding to the

program ID (or genre ID) are read out from the first

memory 27 to set a picture quality adjustment condition.

On the other hand, the picture quality adjustment data

are written in a corresponding relationship to metadata

into the second memory 28, and then when a program or a

scene in which the same metadata are inserted is received

next, the picture quality adjustment data corresponding

to the metadata are read out from the second memory 28 to

set a picture quality adjustment condition.

Metadata relating to a program or a scene may be

information such as an average brightness, a color gain

or a hue or may be an identification code indicative of

an image pickup object such as a night view, fireworks or

a clear sky.

It is to be noted that the present invention can be

applied not only to a TV receiver but also to a set top

box which receives a digital TV signal recorded on a hard

disk, a magnetic disk or a like medium through a digital

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interface such as an interface of the IEEE 1394 standards and decodes the received digital TV signal.

While preferred embodiments of the present invention have been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the following claims.